

A black and white electron micrograph showing a single Ebola virus particle. The virus is a long, thin, filamentous structure with a distinct outer envelope and a darker, more textured inner core. It is coiled in a loose 'U' shape, with one end curving back towards the other. The background is a grainy, light gray.

# **EBOLA VIRUS DISEASE**

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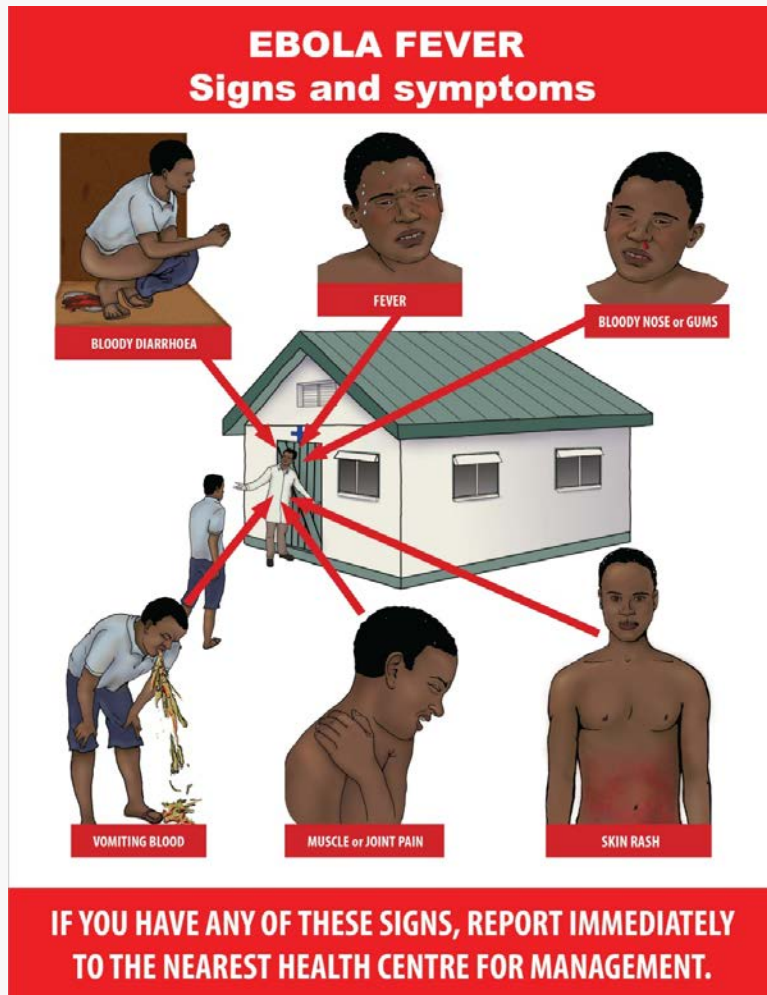
# EBOLA BASICS



## Ebola virus

- Causes a viral hemorrhagic fever
- Incubation period 2-21 days, normally 8-10 days
- Not infectious until person is symptomatic

# SIGNS AND SYMPTOMS

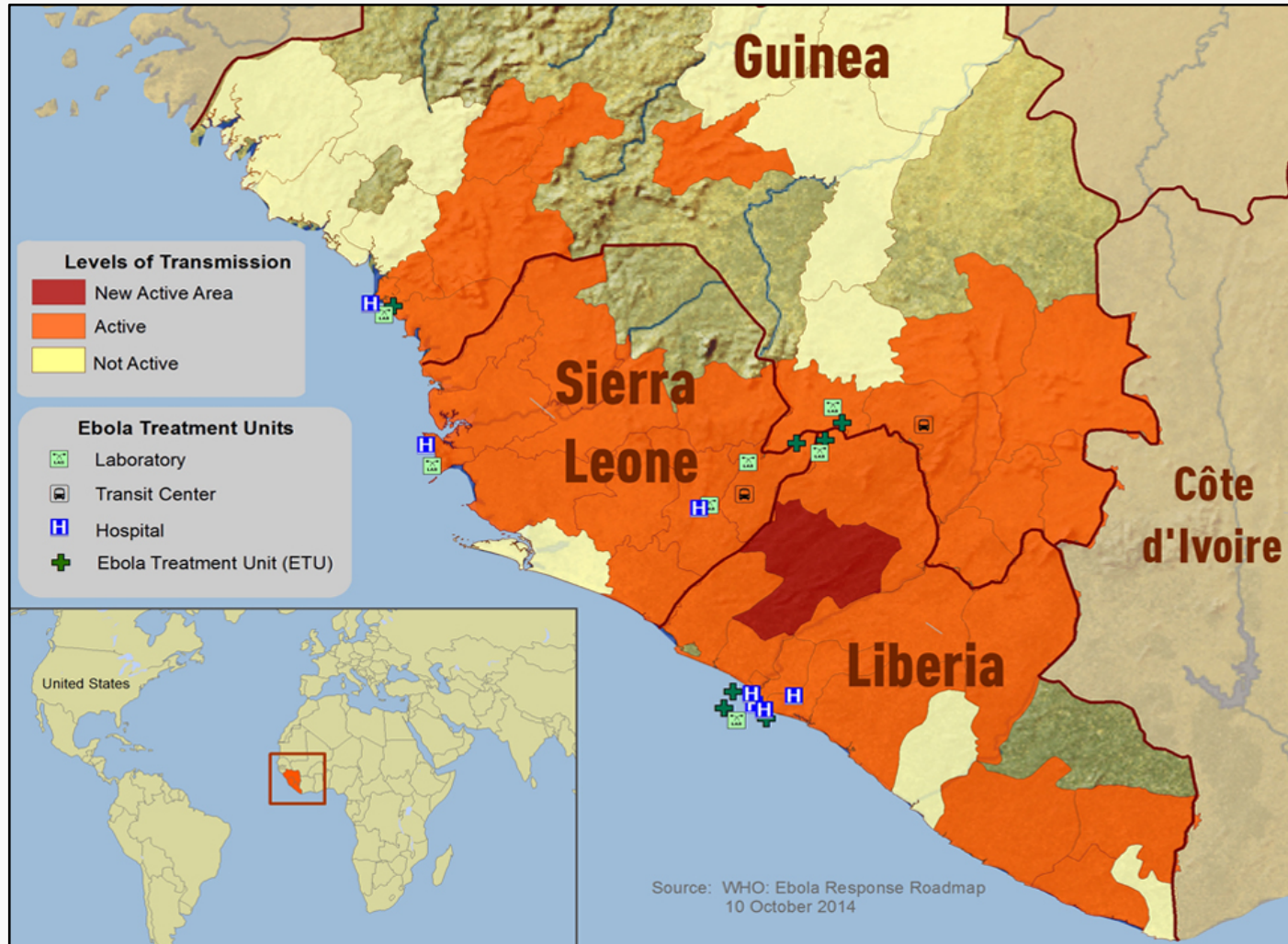


- Initially: **fever (101.5°F or higher)**, headache, fatigue, sore muscles, sore throat
- Progresses to: diarrhea, vomiting, stomach pain, rash, bleeding
- Symptoms: 2-21 days
- Fatality rate: 25%-90%, normally ~50%

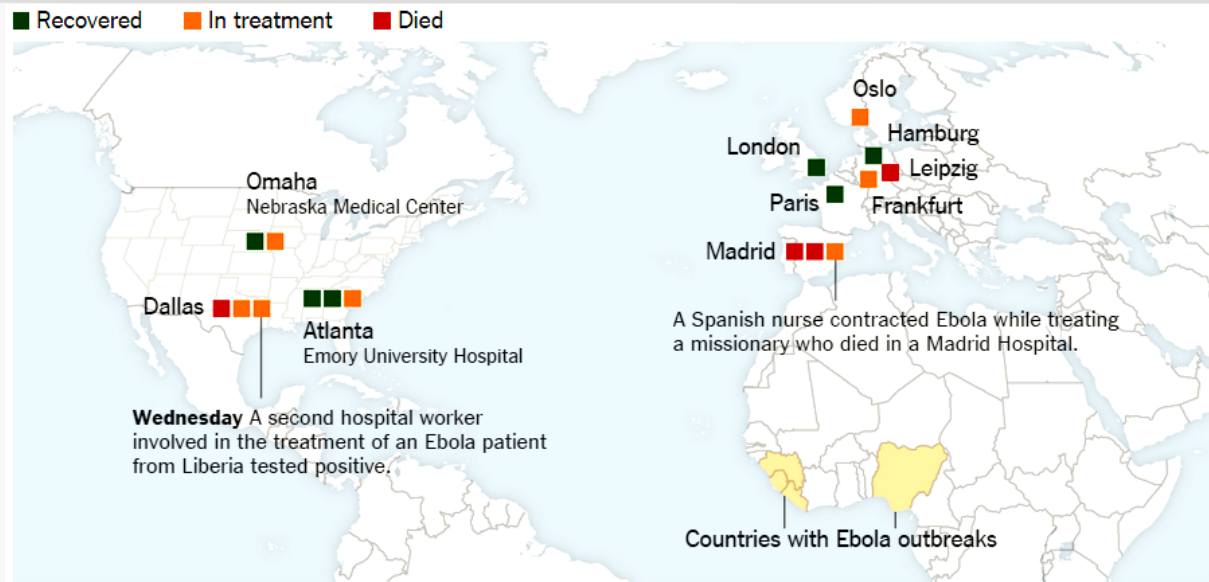


# COUNTRIES WITH WIDESPREAD ACTIVITY

(THROUGH OCTOBER 10, 2014)



# CASES OUTSIDE WEST AFRICA (THROUGH OCTOBER 15, 2014)



## Cases of Ebola Outside of West Africa

As of Oct. 15, 2014

United States	Arrival date	
Aid worker	Aug. 2	Recovered
Missionary	Aug. 2	Recovered
Doctor	Sept. 5	Recovered
Doctor	Sept. 9	In treatment
Visitor	Sept. 30*	Died
NBC cameraman	Oct. 6	In treatment
Hospital worker	Oct. 11*	In treatment
Hospital worker	Oct. 14-15*	In treatment

France		
Nurse	Sept. 19	Recovered
Britain		
Nurse	Aug. 24	Recovered

Spain	Arrival date	
Missionary	Aug. 7	Died
Priest	Sept. 22	Died
Nurse	Oct. 6*	In treatment

Germany		
Doctor	Aug. 27	Recovered
Doctor	Oct. 3	In treatment
U.N. medical worker	Oct. 9	Died

Norway		
Aid worker	Oct. 6	In treatment

\*Date of Ebola diagnosis.

# CASE COUNTS

(DATA THROUGH OCTOBER 15, 2014)

Country	Cases	Deaths	Death Rate
Guinea	1,472	843	57%
Liberia	4,249	2,458	58%
Sierra Leone	3,252	1,183	36%
Nigeria	20	8	40%
Senegal	1	0	0%
United States	2	1	50%
Spain	1	0	0%
Total	8,997	4,493	50%

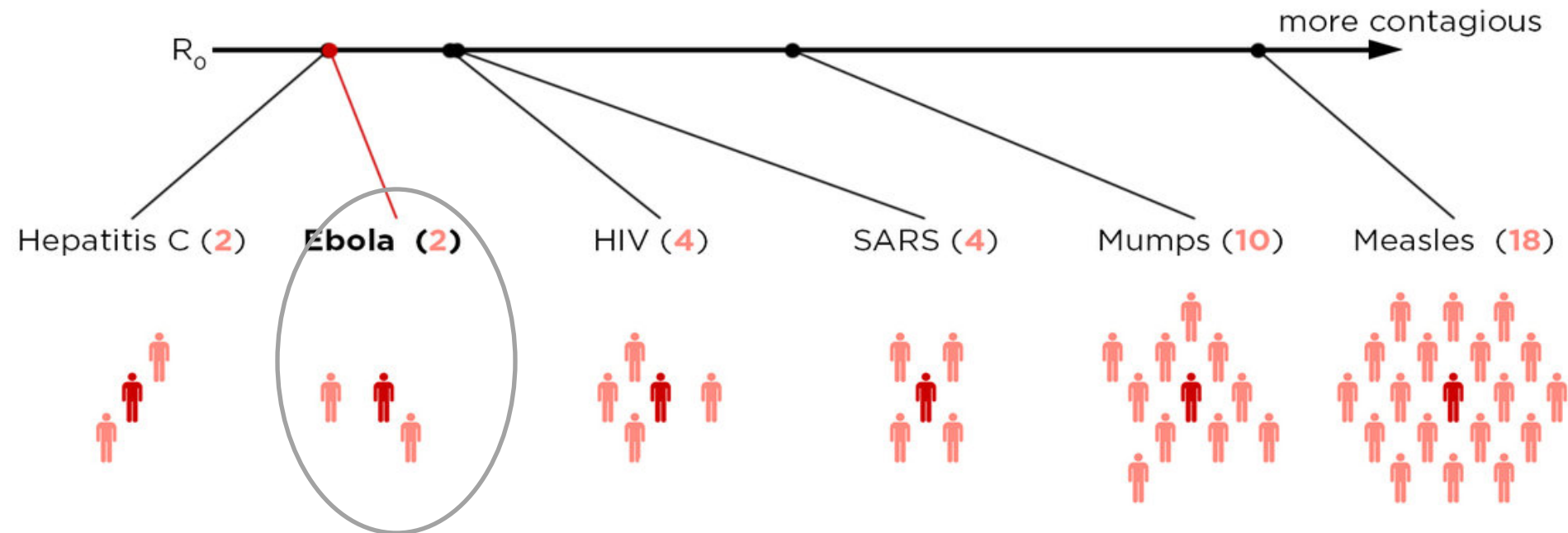
# TRANSMISSION



- Direct contact with blood or bodily fluids of ill person
- Contact with objects (such as needles) contaminated with blood or bodily fluids of ill person
- Ebola is **not** airborne
- Ebola is not spread through food or water

# INFECTIOUSNESS

The number of **people** that **one sick person** will infect (on average) is called  $R_0$ . Here are the maximum  $R_0$  values for a few viruses.





# TREATMENT



- No Ebola-specific treatment exists
- Ebola does not respond to current antibiotics
- Experimental treatments are being developed but not yet available
- Treatment is supportive

# CONTACT TRACING



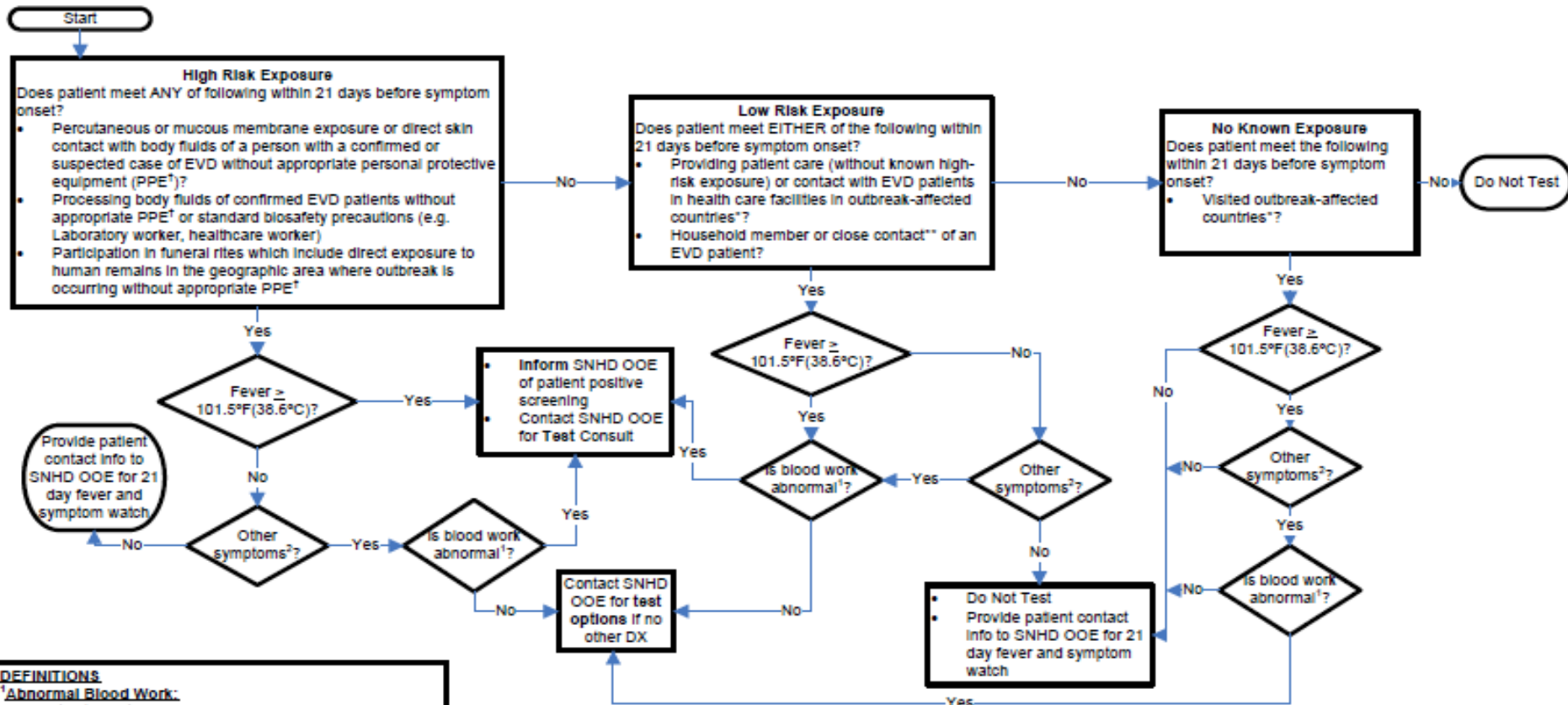
- Finding everyone who had direct contact with a sick Ebola patient
- Watch for 21 days after last contact occurred

# EBOLA VIRUS DISEASE ALGORITHM



## SNHD Interim Algorithm for Ebola Virus Disease (EVD) Testing and Surveillance (updated 10/8/14)

If you suspect EVD, screen for potential risk factors below. If concerns persist, isolate the patient using standard contact and droplet precautions, consider alternative diagnoses<sup>2</sup>, and contact the Southern Nevada Health District (SNHD) Office of Epidemiology (OOE) at (702)759-1300 option 2 for consultation.



### DEFINITIONS

#### <sup>1</sup>Abnormal Blood Work:

- Platelet count  $< 150,000$
- Prolonged PT/PTT
- AST/ALT elevation

#### <sup>2</sup>Other Signs/Symptoms Include:

- Intense weakness
- Muscle Pain
- Headache and sore throat
- Vomiting
- Diarrhea
- Abdominal pain
- Impaired kidney and liver function
- Internal or external bleeding

<sup>1</sup>Outbreak affected areas: Sierra Leone, Guinea, Liberia, Nigeria (Lagos or Port Harcourt) (areas may be updated) refer to <http://www.cdc.gov/vhf/ebola/resources/distribution-map-guinea-outbreak.html#areas>

<sup>2</sup>Close contact is defined as: a.) being within approximately 3 feet (1 meter) of an EVD patient or within the patient's room or care area for a prolonged period of time while not wearing recommended PPE or b.) having direct brief contact (e.g. shaking hands) with an EVD patient while not wearing recommended PPE. Brief interactions, such as walking by a person or moving through a hospital, do not constitute close contact.

<sup>1</sup>PPE guidance can be found at: <http://www.cdc.gov/vhf/ebola/hcp/index.html>

<sup>2</sup>EVD can often be confused with other more common infectious diseases such as malaria, typhoid fever, meningococcemia, and other bacterial infections (e.g., pneumonia). These diseases should be considered. A positive malaria test alone does not rule out EVD.



# LABORATORY TESTING

- Ebola testing is performed at CDC
- Prior consultation with CDC required before samples are submitted for testing

**INTERIM GUIDANCE FOR Specimen Collection, Transport, Testing, and Submission for Patients with Suspected Infection with Ebola Virus Disease**

**NOTIFICATION & CONSULTATION**

Hospitals should follow their state and/or local health department procedures for notification and consultation for Ebola testing requests before contacting CDC. CDC cannot accept any specimens without prior consultation.

FOR CONSULTATION, CALL THE EMERGENCY OPERATIONS CENTER AT 770-488-7100

**WHEN SPECIMENS SHOULD BE COLLECTED FOR EBOLA TESTING**

Ebola virus is detected in blood only after onset of symptoms, most notably fever. It may take up to three days after onset of symptoms for the virus to reach detectable levels. Virus is generally detectable by real-time RT-PCR between 3 to 10 days after onset of symptoms.

Ideally, specimens should be taken when a symptomatic patient reports to a healthcare facility and is suspected of having an Ebola virus exposure. However, if the onset of symptoms is less than three days after potential exposure, a subsequent specimen will be required to rule out Ebola.

**PREFERRED SPECIMENS FOR EBOLA TESTING**

A minimum volume of 4 milliliters of whole blood preserved with EDTA, clot activator, sodium polyanethol sulfonate (SPS), or citrate in plastic collection tubes can be submitted for Ebola virus disease testing.

Specimens should be shipped at 4°C. Do not submit specimens to CDC in glass containers. Do not submit specimens preserved in heparin tubes.

Specimens other than blood may be submitted upon consult with the CDC.

Standard labeling should be applied for each specimen. The requested test needs to be identified only on the requisition and CDC specimen submission forms.

**DIAGNOSTIC TESTING FOR EBOLA PERFORMED AT CDC**

Several diagnostic tests are available for detection of Ebola virus disease. Acute infections will be confirmed using a real-time RT-PCR assay (CDC test directory code CDC-10309 Ebola Identification) in a CLIA-accredited laboratory. Virus isolation may also be attempted. Serologic testing for IgM and IgG antibodies will be completed for certain specimens and to monitor the immune response in confirmed Ebola virus disease patients (CDC-10310 Ebola Serology).

Lassa fever is also endemic in certain areas of West Africa and may show symptoms similar to early Ebola virus disease. Diagnostic tests including but not limited to RT-PCR, antigen detection, and IgM serology may be utilized to rule out Lassa fever in patients who test negative for Ebola virus disease.

**TRANSPORTING SPECIMENS WITHIN THE HOSPITAL / INSTITUTION**

In compliance with 29 CFR 1910.1030, specimens should be placed in a durable, leak-proof secondary container for transport within a facility. To reduce the risk of breakage or leaks, do not use any pneumatic tube system for transporting specimens from a patient with suspected Ebola virus disease.

**PACKAGING & SHIPPING CLINICAL SPECIMENS TO CDC**

**TRIPLE PACKAGING SYSTEM**

Specimens collected for Ebola virus disease testing should be packaged and shipped without attempting to open collection tubes or aliquot specimens.

Specimens for shipment should be packaged following the basic triple packaging system, which consists of a primary receptacle (a sealable specimen bag) wrapped with absorbent material, secondary receptacle (watertight, leak-proof), and an outer shipping package.

**THE SUBMISSION PROCESS**

Contact your state and/or local health department and CDC (770-488-7100) to determine the proper category for shipment based on clinical history and risk assessment by CDC and to obtain detailed shipping guidance and required CDC submission documents. State guidelines may differ and state or local health departments should be consulted before shipping.

INFORMATION ON SHIPPING & TRACKING IS AVAILABLE AT [www.cdc.gov/ebola](http://www.cdc.gov/ebola)



# ENVIRONMENTAL SURVIVAL

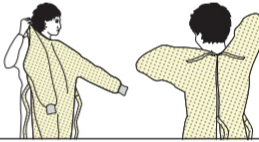





- Ebola virus is killed with hospital-grade disinfectants (such as household bleach) and UV
- Ebola virus on surfaces such as doorknobs and countertops can remain infective for several hours
- Ebola virus in body fluids (such as blood) can remain infective up to several days at room temperature

# PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR HEALTHCARE WORKERS


**SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)**

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

- 1. GOWN**
  - Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
  - Fasten in back of neck and waist
- 2. MASK OR RESPIRATOR**
  - Secure ties or elastic bands at middle of head and neck
  - Fit flexible band to nose bridge
  - Fit snug to face and below chin
  - Fit-check respirator
- 3. GOGGLES OR FACE SHIELD**
  - Place over face and eyes and adjust to fit
- 4. GLOVES**
  - Extend to cover wrist of isolation gown

**USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION**

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



## Putting it on

- Droplet, standard, and contact precautions are recommended for a patient-care setting where a patient with Ebola is present
- Additional PPE might be required for special situations (e.g. aerosol-generating procedures)

# PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR HEALTHCARE WORKERS

## SEQUENCE FOR REMOVING PERSONAL PROTECTIVE EQUIPMENT (PPE)

Except for respirator, remove PPE at doorway or in anteroom. Remove respirator after leaving patient room and closing door.

### 1. GLOVES

- Outside of gloves is contaminated!
- Grasp outside of glove with opposite gloved hand; peel off
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist
- Peel glove off over first gloved hand
- Discard gloves in waste container



### 2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield is contaminated!
- To remove, handle by head band or ear pieces
- Place in designated receptacle for reprocessing or in waste container



### 3. GOWN

- Gown front and sleeves are contaminated!
- Unfasten ties
- Pull away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard



### 4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- Grasp bottom, then top ties or elastics and remove
- Discard in waste container



PERFORM HAND HYGIENE IMMEDIATELY AFTER REMOVING ALL PPE

## Taking it off

- Removal of used PPE needs to be performed carefully and in a specific sequence to avoid exposing the wearer to materials containing Ebola

# PPE FOR OTHER (NON-HEALTHCARE) WORKERS



- Use the safety precautions you would normally use when dealing with a potentially sick or bloody person
- Avoid direct contact with the blood or bodily fluids of ill persons



# EMS PREPAREDNESS



- Public Safety Answering Points (9-1-1 Dispatch Centers) are using a screening tool to determine Ebola risk based on travel history and presence of symptoms of Ebola
- EMS crew is notified of any positive screening results

# EMS PREPAREDNESS



- All EMS crews are using the EMS Ebola Screening Tool to ask questions to every patient related to travel history and presence of Ebola symptoms
- If screening responses indicate potential for Ebola, receiving facilities will be pre-notified to allow for safe and efficient transfer of care

# HOSPITAL PREPAREDNESS



- Southern Nevada Healthcare Preparedness Coalition\* participation ensures healthcare system integration within community
- Community coordination of information, resources, joint planning, training, and exercises is critical to effective incident management

\*MSAC, ED-EMS Leadership Working group, MAB, LEPC, APIC, HS & UAWG

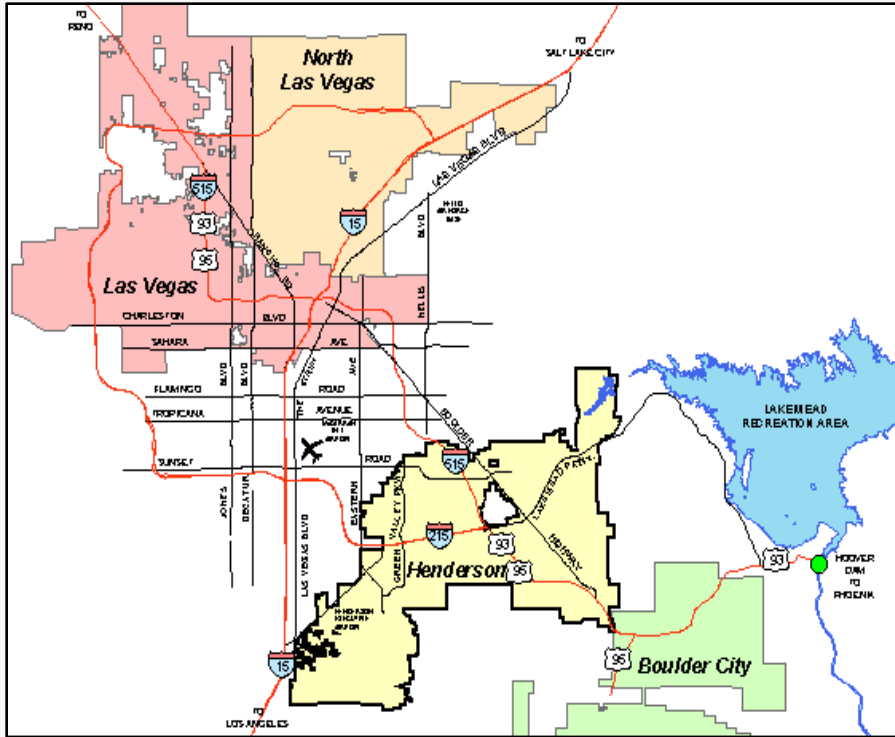
# COMMUNITY PREPAREDNESS



- Clark County Hazard Mitigation Plan and Regional Threat Hazard Identification & Risk Assessment (THIRA) identifies a biological incident as one of top hazards.
- Current plans consider “All-Hazards”
- Joint Training and Exercises

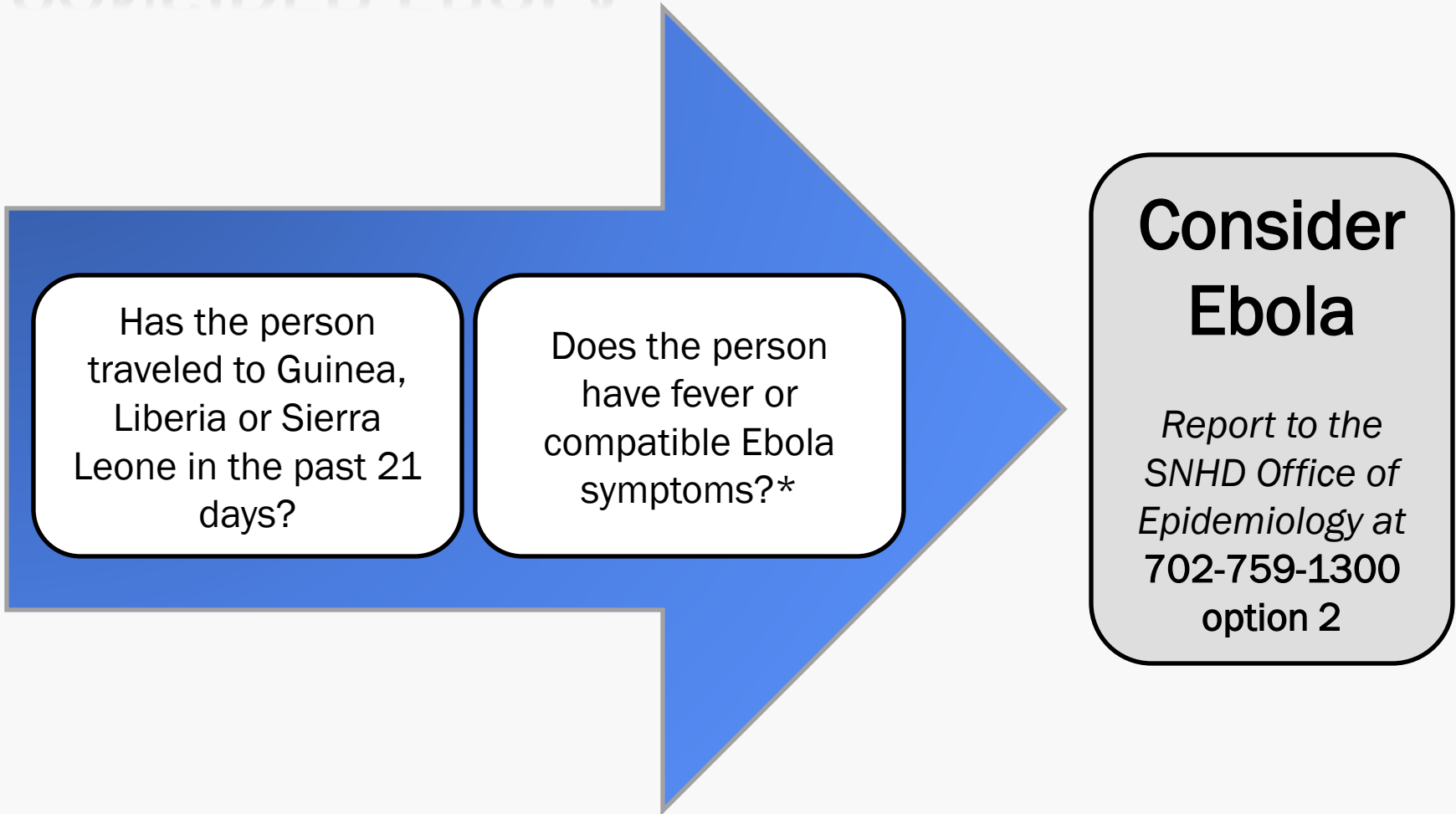


# CLARK COUNTY EBOLA VIRUS PLANNING



- High volume visitor destination
- McCarran-no direct flights from Africa
- Over past months SNHD working with hospitals, EMS to prepare for event
- Created protocols for testing, first responders, and monitoring contacts
- McCarran incident response demonstrated plans work

# CONSIDER EBOLA



\* headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage